General

Guideline Title

(1) Guidelines for the management of acute coronary syndromes 2006. (2) 2007 addendum to the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand guidelines for the management of acute coronary syndromes 2006. (3) 2011 addendum to the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand guidelines for the management of acute coronary syndromes (ACS) 2006.

Bibliographic Source(s)

Acute Coronary Syndrome Guidelines Working Group. Guidelines for the management of acute coronary syndromes 2006. Med J Aust. 2006 Apr 17;184(8 Suppl):S1-32. [105 references] PubMed

Aroney CN, Aylward P, Chew DP, Huang N, Kelly AM, White H, Wilson M, National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand. 2007 addendum to the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand Guidelines for the management of acute coronary syndromes 2006. Med J Aust. 2008 Mar 3;188(5):302-3. [10 references] PubMed

Chew DP, Aroney CN, Aylward PE, Kelly AM, White HD, Tideman PA, Waddell J, Azadi L, Wilson AJ, Ruta LA. 2011 addendum to the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand guidelines for the management of acute coronary syndromes (ACS) 2006. Heart Lung Circ. 2011 Aug;20(8):487-502. [58 references] PubMed

Guideline Status

This is the current release of the guideline.

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- March 22, 2016 – Opioid pain medicines : The U.S. Food and Drug Administration (FDA) is warning about several safety issues with the entire class of opioid pain medicines. These safety risks are potentially harmful interactions with numerous other medications, problems with the adrenal glands, and decreased sex hormone levels. They are requiring changes to the labels of all opioid drugs to warn about these risks.

Recommendations

Major Recommendations

Notes from the National Guideline Clearinghouse (NGC)

- In March 2008, the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand released an addendum to their 2006 guidelines for the management of acute coronary syndrome, highlighting evidence "that strengthens the recommendations in the guidelines or provides alternatives to current recommended practice that should be considered based on the circumstances of the individual patient and setting." This new information is presented under the heading "2008 Addendum: Implications of the Findings."
- The National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand released an additional addendum in August 2011. This addendum "summarises clinical trial evidence published since 2007 that is relevant to the recommendations contained in the Heart Foundation's *Guidelines for the management of acute coronary syndromes 2006* and *2007 addendum to the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand Guidelines for the management of acute coronary syndromes 2006*. These recommendations are directed at the management of patients with spontaneous acute coronary syndromes, rather than those occurring as a result of other conditions (e.g., anaemia or thyrotoxicosis) where management may be directed at the underlying cause. This new information is presented under the heading "2011 Addendum."
- Definitions for the strength of recommendations and levels of evidence for the 2011 addendum are provided at the end of the "Major Recommendations" field.

2006 Guideline

The recommendations that follow are from the 2006 guideline's "Summary of Key Recommendations"; detailed graded recommendations can be found in the original guideline document.

Systems of Care for Patients with Acute Coronary Syndromes

- Effective systems of care are required to deliver optimal care for patients with acute coronary syndromes (ACS), particularly in rural and remote areas.
- Systems of care should be regionally based, and have formal links with specialist centres for consultation and acute interhospital transfer.
- Systems should include appropriate monitoring, feedback, and quality improvement components.
- Clinical decisions about care and transfer should take into account patients' cultural and personal beliefs and wishes.

New Acute Coronary Syndrome Terminology and Implications for Diagnosis

- It is important to establish an initial working diagnosis to guide clinical decision making.
- New definitions of myocardial infarction, based heavily on the presence of cardiac biomarkers, have implications for coding and epidemiological studies. However, clinically they do not influence the indications for ongoing prevention therapies.
- Use of the ACS Dataset (part of the National Health Data Dictionary) can facilitate the collection of data relating to the presentation and management of ACS that can be compared and collated within and between health care providers.

Acute Management of Chest Pain

- People experiencing symptoms of an ACS should seek help promptly and activate emergency medical services.
- The most important initial need is access to a defibrillator to avoid early cardiac death resulting from reversible arrhythmias.
- Aspirin should be given early (i.e., by emergency or ambulance personnel) unless already taken or contraindicated.
- Oxygen should be given, as well as glyceryl trinitrate and intravenous morphine as required.
- As a minimum, medical facilities receiving patients should be given warning of incoming patients in whom there is a high suspicion of an ACS —particularly ST-segment-elevation myocardial infarction (STEMI)—or whose condition is unstable.
- Where appropriate, a 12-lead electrocardiogram (ECG) should be taken en route and transmitted to a medical facility.
- Where formal protocols are in place, prehospital treatment (including fibrinolysis in appropriate cases) should be facilitated.

Investigations

- The ECG is the sole test required to select patients for emergency reperfusion (fibrinolytic therapy or direct percutaneous coronary intervention [PCI]).
- Patients with STEMI who present within 12 hours of the onset of ischaemic symptoms should have a reperfusion strategy implemented

promptly.

- Patients with a suspected ACS without ST-segment elevation on ECG should undergo further observation and investigation to rule out other diagnoses, enable risk stratification, and determine the most appropriate treatment strategy.
- Patients whose ECG and cardiac marker levels are normal after a suitable period of observation should, where practicable, undergo provocative testing (e.g., stress test) before discharge.

Management of Patients with ST-Segment-Elevation Myocardial Infarction

Adjuvant Therapy in Association with Reperfusion

- All patients undergoing reperfusion therapy for STEMI (PCI or fibrinolysis) should be given aspirin and clopidogrel unless these are contraindicated.
- Antithrombin therapy should be given in combination with PCI or fibrinolytic therapy with fibrin-specific fibrinolytic agents, but antithrombin therapy in conjunction with streptokinase is optional.
- It is reasonable to use abciximab with primary PCI, but glycoprotein (GP) IIb/IIIa inhibitors should generally be avoided with full or reduced doses of fibrinolytic therapy.

Choice of Reperfusion Strategy

- Time delay (both to first medical contact and potential PCI or fibrinolytic therapy) plays a major role in determining best management of STEMI.
- In general, PCI is the treatment of choice, providing it can be performed promptly by a qualified interventional cardiologist in an appropriate facility.
- In general, the maximum acceptable delay from presentation to balloon inflation is:
  - 60 minutes if a patient presents within 1 hour of symptom onset; or
  - 90 minutes if a patient presents later

  Note: For patients who present late (between 3 and 12 hours after symptom onset) to a facility without PCI capability, it is appropriate to consider transfer for primary PCI if balloon inflation can be achieved within 2 hours (including transport time).

- All PCI facilities should be able to perform angioplasty within 90 minutes of patient presentation.
- Fibrinolysis should be considered early if PCI is not readily available, particularly in rural and remote areas.
- When there are major delays to hospitalisation (i.e., more than 30 minutes), prehospital fibrinolysis should be considered.
- Reperfusion is not routinely recommended in patients who present more than 12 hours after symptom onset and who are asymptomatic and haemodynamically stable.

Choice of Fibrinolytic Agent

- Second-generation fibrin-specific fibrinolytic agents that are available as a bolus (i.e., reteplase, tenecteplase) are the fibrinolytics of choice.
- These agents should be available at all centres where fibrinolysis may be required.
- Streptokinase is an inappropriate choice in Aboriginal and Torres Strait Islander patients, or in patients with previous exposure to the drug.

Transfer after STEMI

- Patients who have had STEMI should be considered for early transfer to a tertiary cardiac centre with PCI facilities and links to cardiac surgical facilities.
- If immediate transfer is not possible, patients should be transferred or referred as soon as is practicable for assessment of need for revascularisation (through PCI or coronary artery bypass grafting).

Management of Patients with Non-ST-Segment-Elevation Acute Coronary Syndromes

- All patients with non-ST-segment-elevation acute coronary syndromes (NSTEACS) should have their risk stratified to direct management decisions (see page 20 in the original guideline document for stratification criteria).
- All patients with NSTEACS should be given aspirin, unless contraindicated.
- High-risk patients with NSTEACS should be treated with aggressive medical management (including aspirin, clopidogrel, unfractionated heparin or subcutaneous enoxaparin, intravenous tirofiban or eptifibatide and a beta-blocker), and arrangements should be made for coronary angiography and revascularisation, except in those with severe comorbidities.
- Intermediate-risk patients with NSTEACS should undergo an accelerated diagnostic evaluation and further assessment to allow reclassification as low or high risk.

- Low-risk patients with NSTEACS, after an appropriate period of observation and assessment, may be discharged on upgraded medical therapy for outpatient follow up.

Long-term Management after Control of Myocardial Ischaemia

- Before discharge, patients with an ACS should be initiated on a medication regimen, including antiplatelet agent(s), beta-blocker, angiotensin-converting enzyme inhibitor, statin, and other therapies as appropriate.
- Implantable cardiac defibrillators should be considered in some patients who, despite optimal medical therapy, have persistently depressed left ventricular function more than 6 weeks after STEMI.
- Patients should be given advice on lifestyle changes that will reduce the risk of further coronary heart disease (CHD) events, including smoking cessation, nutrition, alcohol, physical activity, and weight management as relevant.
- All patients should have access to, and be actively referred to, comprehensive ongoing prevention and cardiac rehabilitation services.
- All patients should be provided with a written action plan for chest pain.
- Depression and CHD frequently coexist, and in patients with CHD, the presence of depression is more likely to lead to poorer outcomes. Social isolation and lack of social support are also associated with worse outcomes. All patients with CHD should be assessed for depression and level of social support.

2008 Addendum: Implications of the Findings

Reperfusion and Revascularisation for ST-Segment Elevation Myocardial Infarction

Rescue PCI

- The evidence for rescue PCI has strengthened since the development of the 2006 guidelines.
- Patients who receive fibrinolytic therapy and have not reperfused by 90 minutes should be considered for rescue PCI, which optimally should be performed within 12 hours. Transfer between facilities may be necessary to achieve this, and systems need to be in place to facilitate transfer of appropriate patients. If it is not possible for transfer within the 12-hour window, then transfer can be delayed if the patient is asymptomatic.

Revascularisation

Patients in whom the infarct-related artery is completely occluded do not benefit from re-opening the artery routinely if this occurs more than 24 hours after the initial event. If patients are symptomatic, revascularisation may be considered.

Antiplatelet and Antithrombin Therapy

Recent evidence, while providing additional information on outcomes for individual agents, does not provide conclusive evidence of the superiority of one agent over another, nor of one combination of therapies over another. The risks and benefits of these therapies and strategies should be evaluated individually in each patient.

Antithrombin Therapy for Acute STEMI

Enoxaparin and fondaparinux are appropriate antithrombin agents and may be considered for use in patients with STEMI.

Antithrombin Therapy for NSTEACS

- Fondaparinux and bivalirudin, both currently not licensed for upstream therapy of NSTEACS, may be preferable alternatives to standard therapy with unfractionated heparin or low molecular weight heparin with a GP IIb/IIIa inhibitor for patients with high-risk NSTEACS, particularly where there is an increased risk of bleeding. The selection of the most appropriate upstream therapy may best be determined for any individual patient from their risk of ischaemia versus bleeding.
- Fondaparinux may be particularly useful in patients for whom invasive management is significantly delayed or those not suitable for invasive management.
- Bivalirudin has the advantage of monotherapy for both upstream and procedural administration at the time of PCI, and therefore may be particularly useful in patients planning to have an early invasive intervention.

Antiplatelet Therapy for NSTEACS

- GP IIb/IIIa inhibition with abciximab reduces adverse cardiac events in biomarker-positive NSTEACS patients undergoing PCI who have been pretreated with clopidogrel. Pretreatment with high-dose clopidogrel is not an adequate alternative to abciximab among biomarker-positive NSTEACS patients.

- A deferred in-lab initiation approach to the use of intravenous GP IIb/IIIa inhibitors (particularly with abciximab) may be preferable to short-term (median 4 hours) upstream administration in patients presenting with high-risk NSTEACS.

2011 Addendum

Investigation: Serum Troponin Measurement

Implications of the Findings

Previous Recommendations

The 2006 Guidelines advised that serum troponin levels be measured on admission to the emergency department (ED). This recommendation still applies.

The 2006 Guidelines recommended that, if the initial troponin test is negative, it should be repeated at least 8 hours after the last episode of pain or other symptoms of coronary insufficiency. (When used in this way, troponin assays have a high sensitivity for detecting myocardial infarction [MI], but levels may be normal in other presentations of ACS.) This recommendation still applies when using standard-sensitivity troponin assays.

New Recommendations

1. Where available, high sensitivity troponin assays should be used in preference to conventional assays. [Grade of recommendation N/A]
2. When using high sensitivity troponin assays for the identification of patients at increased risk (see *Recommended protocol* in the original guideline document):
    - A test should be interpreted as positive if level is ≥99th centile for reference population OR there is a change of >50% above an initial baseline level. A positive finding identifies patients at increased risk, but does not provide definitive evidence of MI. A positive troponin result should be followed up by a search for an alternative plausible diagnosis and/or cardiac consultation if ACS is suspected in the context of the clinical presentation. [Consensus recommendation]
    - At 3 hours after presentation, a test should be interpreted as negative if level is <99th percentile AND change from baseline is <50% (with at least one of these assays having been performed >6 hours from symptom onset). A negative test in this circumstance may be used in an "early rule-out ACS" strategy to enable earlier functional or anatomic testing for symptomatic coronary artery disease. [Grade C recommendation; Evidence level III]
3. If the local pathology laboratory cannot provide troponin results within 60 min, point-of-care testing should be performed. [Grade of recommendation N/A]

Choice of Reperfusion Therapy for STEMI

Implications of the Findings

Previous Recommendations

The 2006 Guidelines indicated that undertaking immediate PCI after full-dose fibrinolysis, regardless of reperfusion status (also known as facilitated PCI) could not be recommended at the time of writing.

New Recommendations

1. Consider early routine angiography and revascularisation amongst patients receiving fibrinolysis, regardless of the success of pharmacologic reperfusion. [Grade A recommendation, Evidence level I]
2. Antiplatelet therapies should be continued for 12 months for all stented patients. [Grade A recommendation, Evidence level II]
3. The use of mechanical thrombectomy techniques to reduce thrombus burden during primary PCI should be considered. [Grade A recommendation, Evidence level I]

Antithrombotic Therapy for STEMI

Implications of the Findings

Previous Recommendations

The 2006 Guidelines recommended that:

- Antithrombin therapy with unfractionated (UF) heparin should be used in conjunction with PCI and fibrinolysis for patients with STEMI.
- It is reasonable to use abciximab with primary PCI.

- GP IIb/IIIa inhibitors should not be used with full or reduced doses of fibrinolytic therapy.

The 2007 Addendum recommended that enoxaparin and fondaparinux were appropriate antithrombin agents for use in patients with STEMI.

New Recommendations

1. Amongst patients with STEMI undergoing primary PCI, the use of bivalirudin can be considered as an alternative to heparin and GP IIb/IIIa inhibitors. [Grade B recommendation; Evidence level II]
2. Amongst patients undergoing primary PCI for reperfusion for STEMI or revascularisation for ACS, a high-dose clopidogrel regimen (600 mg oral bolus and 150 mg daily for 7 days, then 75 mg/day for at least 12 months) should be considered. [Grade B recommendation, Evidence level II]
3. In patients undergoing PCI, the use of an oral antiplatelet agent (prasugrel and ticagrelor) should be considered as an alternative to clopidogrel for subgroups at high risk of recurrent ischaemic events (e.g., those with diabetes, stent thrombosis, recurrent events on clopidogrel or a high burden of disease on angiography). Careful assessment of bleeding risk should be undertaken before using these agents. [Grade B recommendation; Evidence level II]

Antithrombotic Therapy for NSTEACS

Implications of the Findings

Previous Recommendations

The 2006 Guidelines recommended use of heparin or subcutaneous enoxaparin until angiography, or for 48–72 hours, for those with high-risk NSTEACS.

The 2007 addendum indicated that fondaparinux and/or bivalirudin (both of which were then unlicensed for upstream therapy for NSTEACS), may be preferable alternatives to standard therapy with UF heparin or low-molecular-weight heparin (LMWH) with a GPIIb/IIIa inhibitor for patients with high-risk NSTEACS, particularly in patients with an increased risk of bleeding.

New Recommendations

A new paradigm for the management of patients with high-risk NSTEACS is now recommended. Management decisions must take into consideration the balance between ischaemic and bleeding risk for the individual patient.

1. For all patients with high-risk NSTEACS, consider methods to reduce bleeding risk. [Grade A recommendation, Evidence level I]
    - Titrate antithrombotic agents to optimal dose for weight and renal function. [Grade A recommendation, Evidence level I]
    - Avoid upstream GP IIb/IIIa inhibitors unless there is recurrent ischaemia on standard medical therapy. [Grade B recommendation, Evidence level II]
    - Consider radial access in preference to femoral access for PCI, but be mindful that this may be used as a conduit for surgery (coronary artery bypass graft [CABG]). [Grade B recommendation, Evidence level III]
    - During PCI, avoid right heart catheterisation and intra-aortic balloon pulsation unless indicated, and avoid prolonged procedure times. [Grade C recommendation, Evidence level III]
2. For all patients with high-risk NSTEACS, assess bleeding risk individually according to the number and severity of bleeding risk factors (see Bleeding risk in ACS, below). [Grade A recommendation, Evidence level II]
3. Assign a management strategy according to assessed individual bleeding risk:
   Use a "standard" strategy for patients at low risk of bleeding:

    - Choose the most effective anti-platelet regimen (e.g., prasugrel or ticagrelor). [Grade A recommendation, Evidence level I], and use fast-acting agents or multiple agents, as required, to control ischaemia rapidly. [Grade B recommendation, Evidence level II]

Use a "priority low-bleeding" strategy in patients at high risk of bleeding:

- Use antithrombotic agents with a lower bleeding risk, e.g.:
    - Clopidogrel in preference to prasugrel. [Grade B recommendation, Evidence level II]
    - (In the context of a non-invasive strategy) fondaparinux in preference to enoxaparin. [Grade B recommendation, Evidence level II]
    - (In the context of an invasive strategy) bivalirudin in preference to enoxaparin. [Grade B recommendation, Evidence level II]
- Minimise the number of agents used. [Grade B recommendation, Evidence level II]
- When additional agents are needed, consider substituting rather than adding them. [Grade B recommendation, Evidence level II]
- Consider shorter-acting or reversible agents, e.g., bivalirudin. [Grade B recommendation, Evidence level II]

- Avoid the use of GP IIb/IIIa inhibitors, if possible. [Grade B recommendation, Evidence level II]

Bleeding Risk in ACS

Implications of the Findings

Previous Recommendations

The 2006 Guidelines specify the following contraindications to fibrinolysis based on bleeding risk:

- Full-dose GP IIb/IIIa inhibitors with fibrinolytic therapy, particularly in the elderly
- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed head or facial trauma within 3 months
- Suspected aortic dissection (including new neurological symptoms)
- Current use of anticoagulants (risk of bleeding is positively correlated with international normalised ratio)
- Non-compressible vascular punctures
- Recent major surgery (<3 weeks)
- Traumatic or prolonged (>10 min) cardiopulmonary resuscitation
- Recent (within 4 weeks) internal bleeding (for example, gastrointestinal or urinary tract haemorrhage)
- Active peptic ulcer

These recommendations still apply in addition to new recommendations.

New Recommendations

1. The following risk factors should be considered when assessing bleeding risk and when choosing anti-thrombotic therapies in patients with ACS [Grade B recommendation, Evidence level II]:
    - Age >75 years
    - Female sex
    - History of bleeding
    - History of stroke or transient ischaemic attack (TIA)
    - Creatinine clearance rate <60 mL/min
    - Diabetes
    - Heart failure
    - Tachycardia
    - Blood pressure <120 mmHg or >180 mmHg
    - Peripheral vascular disease
    - Anaemia
    - Concomitant use of a GP IIb/IIIa inhibitor
    - Administration of enoxaparin 48 hours prior to intervention
    - Switching between UF heparin and enoxaparin
    - Procedural factors associated with increased risk (femoral artery versus radial artery access, prolonged procedure, intra-aortic balloon pulsation, right heart catheterisation)

Oxygen Therapy for Patients with ACS

Implications of the Findings

Previous Recommendation

The 2006 Guidelines recommended administration of oxygen in transit and on arrival to hospital for patients with suspected ACS. This recommendation has been superseded.

New Recommendation

1. The routine use of supplemental oxygen is not recommended. [Grade C recommendation, Evidence level I]
2. Oxygen therapy is indicated for patients with hypoxia (oxygen saturation <93%) and those with evidence of shock, to correct tissue hypoxia. In the absence of hypoxia, the benefit of oxygen therapy is uncertain, and in some cases oxygen therapy may be harmful. [Consensus recommendation]

System Factors

Implications of the Findings

Timely reperfusion remains a key treatment objective in the management of STEMI.

Previous Recommendation

The 2006 Guidelines stated that local approaches to reperfusion depend on the specific local resources available for assessment, transfer, and delivery of care.

New Recommendations

1. System-based approaches to deliver timely reperfusion should be undertaken at local level. Establishment of clinical networks and efficient protocols to maximise the proportion of patients receiving timely reperfusion should be considered. [Grade B recommendation; Evidence level III-1]
2. Routine audit should be integrated into all clinical services that provide care to patients with ACS. [Grade B recommendation; Evidence level III]
3. In the absence of ready access to primary PCI services, systems should be developed to train local general practitioners and other health workers to initiate fibrinolysis in patients with STEMI, to maintain practitioners' skills, and to ensure practitioners are supported by ready access to expert cardiology consultation. [Recommendation grade N/A]

Definitions:

2011 Addendum Grades of Recommendations

A. Body of evidence can be trusted to guide practice

B. Body of evidence can be trusted to guide practice in most situations

C. Body of evidence provides some support for recommendation(s) but care should be taken in its application

D. Body of evidence is weak and recommendation must be applied with caution

N/A. Not applicable—recommendation cannot be graded

2011 Addendum Levels of Evidence

Levels of evidence were rated according to current National Health and Medical Research Council classifications, available at the National Health and Medical Research Council Web site .

Clinical Algorithm(s)

2006 Guideline

Clinical algorithms are provided in the original 2006 guideline document for the following:

- Defining acute coronary syndromes over time: presentation to final diagnosis
- Hospital management of ST-segment-elevation myocardial infarction (STEMI)
- Prehospital management of STEMI
- Treatment strategies for patients with non-ST-segment elevation acute coronary syndromes (NSTEACS), based on risk stratification
- Implantable cardiac defibrillator (ICD) implantation after STEMI: proposed management
- Emergency department/cardiac care unit (CCU) guidelines for the management of acute coronary syndromes

2011 Addendum

An algorithm for incorporating a high sensitivity troponin into the work-up of patients with suspected acute coronary syndrome (ACS) is provided in the 2011 addendum document.

Scope

Disease/Condition(s)

Acute coronary syndrome (ACS), including both ST-segment-elevation myocardial infarction and non-ST-segment-elevation ACS

Guideline Category

Diagnosis

Management

Treatment

Clinical Specialty

Cardiology

Emergency Medicine

Internal Medicine

Intended Users

Emergency Medical Technicians/Paramedics

Physicians

Guideline Objective(s)

2006 Guideline

- To incorporate contemporary information on the diagnosis and management of acute coronary syndrome into a set of recommendations that defines the boundaries of highest quality care
- To expand on previous guidelines by consolidating recommendations for the management of ST-segment-elevation myocardial infarction (STEMI), non-ST-segment-elevation myocardial infarction, and unstable angina, as well as incorporating the newer developments that have arisen since the previous guidelines

2008 Addendum

To supplement the recommendations outlined in the 2006 guideline

2011 Addendum

To summarise clinical trial evidence published since 2007 that is relevant to the recommendations contained in the Heart Foundation's *Guidelines for the management of acute coronary syndromes 2006* and *2007 addendum to the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand Guidelines for the management of acute coronary syndromes 2006*

Target Population

Patients with acute coronary syndromes (ACS), which includes a broad spectrum of clinical presentations, spanning ST-segment-elevation myocardial infarction, through to an accelerated pattern of angina without evidence of myonecrosis

2011 Addendum

Patients with spontaneous ACS, rather than those occurring as a result of other conditions (e.g., anaemia or thyrotoxicosis) where management may be directed at the underlying cause

Interventions and Practices Considered

1. Establishing adequate systems of care
2. Establishing initial working diagnosis
3. Encouraging patients to seek help promptly including the use of emergency medical services
4. Providing access to defibrillator
5. Managing chest pain with aspirin, oxygen, and glyceryl trinitrate and intravenous morphine, as required (note: supplemental oxygen therapy is not recommended routinely)
6. Provide advanced warning to medical facilities
7. Electrocardiogram (ECG) en route to medical facility
8. Prehospital treatment (including fibrinolysis as appropriate)
9. Investigations including ECG, cardiac marker levels (preferably high-sensitivity troponin assays), and provocative testing (e.g., stress test) before discharge
10. Management of patients with ST-segment-elevation myocardial infarction (STEMI) with early angiography and reperfusion (percutaneous coronary intervention [PCI] or fibrinolysis), adjuvant antiplatelet or antithrombin therapy in association with reperfusion, mechanical thrombectomy during PCI, and transfer of patients after STEMI to a tertiary cardiac centre
11. Management of patients with non-ST-segment-elevation acute coronary syndromes (NSTEACS) using risk stratification and aggressive medical management with antiplatelet or antithrombin therapy, coronary angiography, revascularisation, accelerated diagnostic evaluation, discharge (as appropriate)
12. Avoidance of GP IIb/IIIa inhibitors in those at high risk of bleeding
13. Long-term management including medication regimen (antiplatelet agents, beta-blocker, angiotensin-converting enzyme inhibitor, statin), implantable cardiac defibrillators, lifestyle education, referral for prevention and cardiac rehabilitation services, written action plans, and assessment of depression and social support
14. Use of system-based approaches at the local level to deliver timely reperfusion

Major Outcomes Considered

- Rates of deaths, myocardial infarctions, reinfarctions, and strokes
- Sensitivity and specificity of troponin assays
- Rates of adverse events, including bleeding

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Searches of Unpublished Data

Description of Methods Used to Collect/Select the Evidence

2006 Guideline

Not stated

2011 Addendum

Systematic literature searches based on PubMed and recent conference presentations and abstracts were undertaken by the lead authors for each chapter of the addendum. The cut-off for the literature search was 2010.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

2006 Guideline

Levels of Evidence

I: Evidence obtained from a systematic review of all relevant randomised controlled trials (RCTs)

II: Evidence obtained from at least one properly designed randomised controlled trial

III-1: Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method)

III-2: Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case-control studies, or interrupted time series without a control group

III-3: Evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series with a parallel control group

IV: Evidence obtained from case series, either post-test or pre-test and post-test

2011 Addendum

Levels of evidence were rated according to current National Health and Medical Research Council classifications, available at the National Health and Medical Research Council Web site .

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

Description of the Methods Used to Analyze the Evidence

Not stated

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

2006 Guideline

The guidelines were developed on a foundation of evidence-based criteria, using a consensus approach. They are the outcome of a review of recent evidence, representations of key expert groups and stakeholders, and many meetings of writing group members during 2004 and 2005.

2011 Addendum

An expert writing group was convened in 2009, facilitated by the National Heart Foundation of Australia, driven by new evidence emerging in the treatment of acute coronary syndromes (ACS).

Rating Scheme for the Strength of the Recommendations

2006 Guideline

Grades of Recommendations

A. Rich body of high-quality randomised controlled trial (RCT) data (evidence level I)
B. Limited body of RCT data or high-quality non-RCT data (evidence level II, III-1, III-2)
C. Limited evidence (evidence level III-3, IV)
D. No evidence available – panel consensus judgment

2011 Addendum

A. Body of evidence can be trusted to guide practice

B. Body of evidence can be trusted to guide practice in most situations

C. Body of evidence provides some support for recommendation(s) but care should be taken in its application

D. Body of evidence is weak and recommendation must be applied with caution

N/A. Not applicable—recommendation cannot be graded

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

2006 Guideline

Broad consultation was undertaken to finalise the content of these guidelines, and they have been endorsed by:

- Australasian College for Emergency Medicine
- Australian Cardiac Rehabilitation Association
- Australian Indigenous Doctors' Association
- Australian Resuscitation Council
- Council of Ambulance Authorities
- Council of Remote Area Nurses of Australia Inc
- Internal Medicine Society of Australia and New Zealand
- Kidney Health Australia
- National Aboriginal Community Controlled Health Organisation
- Royal Australian College of General Practitioners
- Royal College of Nursing Australia

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

The type of evidence supporting the recommendations is specifically stated for selected recommendations in the original guideline document and for all recommendations in the 2011 addendum.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Accurate diagnosis and appropriate management of acute coronary syndromes

Potential Harms

2006 Guideline

- Enoxaparin may be used in conjunction with fibrin-specific fibrinolytic agents, but care should be taken in patients who are aged over 75 years or who have renal dysfunction, as dose adjustment is necessary. Also, in patients receiving fibrinolysis for ST-segment-elevation myocardial infarction (STEMI), the use of enoxaparin is associated with an increase in episodes of major bleeding.
- Full-dose glycoprotein (GP) IIb/IIIa inhibitors should be avoided with fibrinolytic therapy as there is evidence of excessive bleeding (including intracranial haemorrhage) with this combination.
- Streptokinase should not be given to patients with previous exposure (more than 5 days ago) to the drug. There is also evidence that streptokinase may be less effective in Aboriginal and Torres Strait Islander peoples because of the high levels of skin infection (and thus streptococcal antibodies), particularly in remote populations.
- Side effects associated with streptokinase include hypotension and allergy.

Contraindications

Contraindications

Contraindications and Cautions for Fibrinolysis Use in ST-segment-elevation Myocardial Infarction

Absolute Contraindications

Risk of Bleeding

- Active bleeding or bleeding diathesis (excluding menses)
- Significant closed head or facial trauma within 3 months
- Suspected aortic dissection (including new neurological symptoms)

Risk of Intracranial Haemorrhage

- Any prior intracranial haemorrhage
- Ischaemic stroke within 3 months
- Known structural cerebral vascular lesion (e.g., arteriovenous malformation)
- Known malignant intracranial neoplasm (primary or metastatic)

Relative Contraindications

Risk of Bleeding

- Current use of anticoagulants: the higher the international normalised ratio (INR), the higher the risk of bleeding
- Non-compressible vascular punctures
- Recent major surgery (<3 weeks)

- Traumatic or prolonged (>10 minutes) cardiopulmonary resuscitation
- Recent (within 4 weeks) internal bleeding (e.g., gastrointestinal or urinary tract haemorrhage)
- Active peptic ulcer

Risk of Intracranial Haemorrhage

- History of chronic, severe, poorly controlled hypertension
- Severe uncontrolled hypertension on presentation (>180 mmHg systolic or >110 mmHg diastolic)
- Ischaemic stroke more than 3 months ago, dementia, or known intracranial abnormality not covered in contraindications

Other

Pregnancy

Qualifying Statements

Qualifying Statements

2006 Guideline

- These guidelines were developed by means of a consensus approach which involved an independent assessment of key Australian and international evidence-based clinical guidelines, scientific articles and trial data, which are incomplete in some areas.
- Recommendations are not necessarily congruent with current Australian Pharmaceutical Benefits Scheme criteria for eligibility for subsidy in all areas.
- The guidelines provide a general framework for appropriate practice, to be followed subject to the practitioner's judgement in each individual case. All treatments should be individualised according to the patient's comorbidities, drug tolerance, lifestyle and living circumstances, and wishes.
- For all medications, observe usual contraindications, be mindful of the potential for significant and possibly adverse drug interactions and allergies, and monitor and review patients carefully and regularly.
- Where drug therapy is recommended for indefinite use, these recommendations have been based on the extrapolated findings of clinical trials which are by their nature of limited duration.
- The guidelines are designed to provide information to assist decision making, and are based on the best information available up to September 2005. It should be understood that the context in which clinical trials are performed and the local environment in which practice is undertaken must always be considered when assessing the evidence base for guidelines and, at times, their local implementation.
- The information in these guidelines has been independently researched and developed by the National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand, and is based on scientific evidence. It is not an endorsement of any particular company, product or service.
- This document has been produced by the National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand for the information of health professionals. The statements and recommendations it contains are, unless labeled as "expert opinion", based on independent review of the available evidence. Interpretation of this document by those without appropriate medical and/or clinical training is not recommended, other than at the request of, or in consultation with, a relevant health professional.
- While care has been taken in preparing the enclosed information, the National Heart Foundation of Australia and the Cardiac Society of Australia and New Zealand and their employees cannot accept any liability, including for any loss or damage resulting from the reliance on the information, or for the accuracy, currency or completeness of the information.

2011 Addendum

When applying this information, clinicians should consider the context and circumstances of the individual patient and the clinical setting.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

Quick Reference Guides/Physician Guides

Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Timeliness

Identifying Information and Availability

Bibliographic Source(s)

Acute Coronary Syndrome Guidelines Working Group. Guidelines for the management of acute coronary syndromes 2006. Med J Aust. 2006 Apr 17;184(8 Suppl):S1-32. [105 references] PubMed

Aroney CN, Aylward P, Chew DP, Huang N, Kelly AM, White H, Wilson M, National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand. 2007 addendum to the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand Guidelines for the management of acute coronary syndromes 2006. Med J Aust. 2008 Mar 3;188(5):302-3. [10 references] PubMed

Chew DP, Aroney CN, Aylward PE, Kelly AM, White HD, Tideman PA, Waddell J, Azadi L, Wilson AJ, Ruta LA. 2011 addendum to the National Heart Foundation of Australia/Cardiac Society of Australia and New Zealand guidelines for the management of acute coronary syndromes (ACS) 2006. Heart Lung Circ. 2011 Aug;20(8):487-502. [58 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

2006 Apr (addenda released 2008 Mar and 2011 Aug)

Guideline Developer(s)

Cardiac Society of Australia and New Zealand - Disease Specific Society

National Heart Foundation of Australia - Disease Specific Society

Source(s) of Funding

National Heart Foundation of Australia

Cardiac Society of Australia and New Zealand

Guideline Committee

Acute Coronary Syndrome Guidelines Working Group

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2006 Guideline

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2008 Addendum

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Financial Disclosures/Conflicts of Interest

2006 Guideline

The following working group members are consultants, advisory committee members, or receive honoraria, fees for service, or travel assistance (independent of research related meetings) from, or have research or other associations with the organisations listed: Roger Allan—Merck Sharpe & Dohme, Sanofi; Con Aroney—CSL, Merck Sharpe & Dohme, Sanofi-aventis; Phil Aylward—Sanofi-aventis, Pfizer, Merck, Bristol-Myers Squibb, Boehringer Ingelheim, AstraZeneca, Procter & Gamble, Eli Lilly, The Medicines Co, Servier, CSL, Schering Plough; David Brieger—Aventis, Sanofi, Boehringer Ingelheim, Merck Sharpe & Dohme; Alex Brown—National Heart Foundation of Australia, Australian Indigenous Doctors' Association, Alice Springs Hospital Management Board, Bristol-Myers Squibb, Pfizer; Gerard Carroll—Aventis, Bristol-Myers Squibb, AstraZeneca, Merck Sharpe & Dohme, Servier, Solvay, Roche; Derek Chew—Merck Sharpe & Dohme, Sanofi, Pfizer; Ian Jacobs—St John Ambulance, Australian Government Department of Health and Ageing, Convention of Ambulance Authorities Australia, National Health and Medical Research Council, Laerdal Foundation, National Heart Foundation of Australia, Health Department of Western Australia; Anne-Maree Kelly—Proctor & Gamble/Alexion, Boehringer Ingelheim; Shiong Tan—Health Department of Western Australia (Office of Safety & Quality and Sentinel event review group), Royal Australian College of General Practitioners (Quality Care National Standing Committee), National Prescribing Service (Director), Royal Australian College of General Practitioners (WA) Faculty (Director); Andrew Tonkin—AstraZeneca, Bristol-Myers Squibb, Pfizer, Sankyo, Fournier, Servier, Merck Sharpe & Dohme; Warren Walsh—Roche; Harvey White—The Medicines Company, AstraZeneca, Aventis, Bayer, Boehringer Ingelheim, Eli Lilly, Merck Sharpe & Dohme, Novartis, Pfizer, Roche, Servier, Wyeth Ayerst

2008 Addendum

Constantine Aroney has received speaker fees from CSL. Philip Aylward has received research honoraria, speaker fees or travel assistance from TIMI Group (Harvard University), VIGOUR Group (Duke University), Pfizer, AstraZeneca, Eli Lilly, Boehringer Ingelheim and Sanofi-Aventis, and is a member of advisory boards to AstraZeneca, Sanofi-Aventis, Eli Lilly, CSL, Boehringer Ingelheim, and Pfizer. Derek Chew has received speaker fees from CSL and Sanofi-Aventis. Anne-Maree Kelly is a member of an advisory board to Sanofi-Aventis. Harvey White has received research grants, consulting fees or speaker fees from Sanofi-Aventis, Eli Lilly, Medicines Company, NIH, GlaxoSmithKline, Pfizer, Roche, Johnson & Johnson, Schering-Plough, Merck Sharpe & Dohme, Novartis, AstraZeneca, Boehringer Ingelheim, Servier Laboratories, Wyeth Ayerst, and Bayer

2011 Addendum

Derek Chew has received travel assistance, speaker fees or been on the advisory board for Astra Zeneca Australia, Eli-Lilly Australia and Sanofi Aventis Australia. Con Aroney has received travel assistance from Boehringer Ingelheim. Philip Aylward has received research honoraria, research grants, travel assistance or been on advisory boards for Boehringer Ingelheim, Astra Zeneca, Eli-Lilly, CSL, Merck Sharp & Dohme, Pfizer, Sanofi Aventis. Philip Tideman has received speakers honoraria from Roche Diagnostics Australia. Harvey White has received research grants from Sanofi Aventis, Eli-Lilly, The Medicines Company, National Institutes of Health, Pfizer, Roche, Johnson & Johnson, Schering Plough, Merck Sharp & Dohme, Astra Zeneca, Daiichi Sankyo Pharma Development, Bristol-Myers Squibb and consulting fees from Regado Biosciences. Anne-Maree Kelly is a member of advisory boards to Astra Zeneca and Merck Sharp & Dohme and has received travel assistance from Radiometer Pty Ltd, is the Senior Clinical Advisor for the Emergency Care Improvement and Innovation Clinical Network (Department of Health Victoria), is on the editorial boards of *Emergency Medicine Australasia*, *Annals of Emergency Medicine* and *Hong Kong Journal of Emergency Medicine* and conducts research in acute cardiology and biomarkers.

Guideline Endorser(s)

Australian Cardiac Rehabilitation Association - Professional Association

Australian College for Emergency Medicine - Medical Specialty Society

Australian Indigenous Doctors Association - Professional Association

Australian Resuscitation Council - Professional Association

Council of Ambulance Authorities (Australia) - Professional Association

Council of Remote Area Nurses of Australia Inc. - Professional Association

Internal Medicine Society of Australia and New Zealand - Medical Specialty Society

Kidney Health Australia - Professional Association

National Aboriginal Community Controlled Health Organisation - National Government Agency [Non-U.S.]

Royal Australian College of General Practitioners - Professional Association

Royal College of Nursing, Australia - Professional Association

Guideline Status

This is the current release of the guideline.

Guideline Availability

2006 Guideline

- Electronic copies: Available in Portable Document Format (PDF) from the National Heart Foundation of Australia Web site .

Print copies: Available from the National Heart Foundation of Australia's national telephone information service at 1300 36 27 87 or E-mail: heartline@heartfoundation.com.au.

2008 Addendum

- Electronic copies: Available in Portable Document Format (PDF) to subscribers from the Medical Journal of Australia .

2011 Addendum

- Electronic copies: Available in Portable Document Format (PDF) to registered users from the Heart, Lung and Circulation Web site .

Availability of Companion Documents

The following are available:

- Guidelines for the management of acute coronary syndromes 2006. Summary of key recommendations. 2006. 4 p. Electronic copies: Available in Portable Document Format (PDF) from the National Heart Foundation of Australia Web site .
- Acute coronary syndromes treatment algorithm. 2011 Sep. 1 p. Electronic copies: Available in PDF from the National Heart Foundation of Australia Web site .
- Implementation of acute coronary syndromes guidelines in Australia. 2009. 3 p. Electronic copies: Available in PDF from the National Heart Foundation of Australia Web site .

Print copies: Available from the National Heart Foundation of Australia's national telephone information service at 1300 36 27 87 or E-mail:

heartlineSA@heartfoundation.com.au.

Patient Resources

None available

NGC Status

This NGC summary was completed by ECRI on April 6, 2007. The information was verified by the guideline developer on June 27, 2007. This summary was updated by ECRI Institute on March 14, 2008 following the updated FDA advisory on heparin sodium injection. This summary was updated on January 5, 2009. The updated information was verified by the guideline developer on February 2, 2009. This summary was updated by ECRI Institute on January 5, 2010 following the U.S. Food and Drug Administration advisory on Plavix (Clopidogrel). This summary was updated by ECRI Institute on May 17, 2010 following the U.S. Food and Drug Administration advisory on Plavix (clopidogrel). This summary was updated by ECRI Institute on July 27, 2010 following the FDA drug safety communication on Heparin. This summary was updated by ECRI Institute on June 27, 2011 following the U.S. Food and Drug Administration advisory on Zocor (simvastatin). This NGC summary was updated by ECRI Institute on March 21, 2012. The updated information was verified by the guideline developer on March 28, 2012. This summary was updated by ECRI Institute on March 10, 2014 following the U.S. Food and Drug Administration advisory on Low Molecular Weight Heparins. This summary was updated by ECRI Institute on June 2, 2016 following the U.S. Food and Drug Administration advisory on Opioid pain medicines.

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